

### **REMARKS**

Claims 1-34 are presently pending. Claims 24-34 are allowed. Claims 35-52 are canceled. Reconsideration of presently pending claims 1-34 is respectfully requested in light of the following remarks.

#### **Allowable Subject Matter, Claims 24-34**

Applicants thank Examiner Angadi for the allowance of claims 24-34. However, for the reasons set forth hereafter, Applicants respectfully submit that all of the claims are directed to allowable subject matter and that the application is in condition for allowance.

#### **Rejections Under 35 U.S.C. §103(a), Claims 1, 3, 5, 7-10, 12, 13, 15, 18-21, 23**

Claims 1, 3, 5, 7-10, 12, 13, 15, 18-21, and 23 are rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Kim (U.S. Publication No. 2002/0106891). Applicants traverse this rejection on the grounds that these references are defective in establishing a prima facie case of obviousness with respect to claims 1 and 13.

As the PTO recognizes in MPEP § 2142:

*... The examiner bears the initial burden of factually supporting any prima facie conclusion of obviousness. If the examiner does not produce a prima facie case, the applicant is under no obligation to submit evidence of nonobviousness...*

It is submitted that, in the present case, the examiner has not factually supported a prima facie case of obviousness for the following, mutually exclusive, reasons.

#### **1. The Reference Does Not Teach or Suggest the Claimed Subject Matter**

The Kim reference cannot be applied to reject claims 1 and 13 under 35 U.S.C. § 103(a). Kim does not disclose or suggest “performing a first treatment comprised of He plasma on said low k dielectric layer in a process chamber to form a transformed low k dielectric layer; and performing a second treatment comprised of H<sub>2</sub> plasma on said transformed low k dielectric layer in a process chamber.”

The Examiner alleges in the "Response to Arguments" that Kim discloses plasma treatments by H<sub>2</sub> plasma and He plasma (Table 1 on page 3) and that Kim concludes that the plasma treatment does not have significant influence on the relative dielectric constant of the silicon oxycarbide layer (paragraph 44). As a result, the Examiner states that any combination of plasma treatments with disclosed known plasma would produce similar results in the absence of unexpected results. Applicants respectfully disagree.

At column 6, lines 25-58, Kim discloses that "Table 1 indicates changes of the relative dielectric constant resulting from performing the plasma treatment of several types under the same condition. . . .The plasma treatment does not have a significant influence on the relative dielectric constant of the silicon oxycarbide layer. Thus the silicon oxycarbide layer can be used as an interlayer insulation layer."

In this section, Kim merely discloses a single treatment using several types of plasma. There is no teaching or suggestion of a second treatment of plasma using any of the above types in Kim. Also, there is no mention in Kim to perform a second treatment of H<sub>2</sub> plasma once the plasma-treated silicon oxycarbide layer is formed, because the plasma treatment does not have significance influence on the relative dielectric constant of the silicon oxycarbide layer according to Kim.

In addition, any combination of the plasma treatments as disclosed in Kim would not produce similar results as alleged by the Examiner, because Kim only performs a single plasma treatment with a plasma source gas selected from a group of He, H<sub>2</sub>, N<sub>2</sub>O, NH<sub>3</sub>, N<sub>2</sub>, O<sub>2</sub>, and Ar, or a combination of the above gases (column 5, lines 58-60). Since there is no significance influence to the dielectric constant after the first treatment, one of ordinary skill in the art would not produce similar results by modifying Kim. Instead, Kim discourages one of ordinary skill in the art from performing a second treatment of plasma because of the lack of significant influence on the dielectric constant. Thus, with Kim's demotivation of performing a second plasma treatment, no similar results would be achieved by one of ordinary skill in the art.

Furthermore, the Examiner alleges that since both hydrogen and helium are suitable, a process involving both plasmas would not distinguish a process using a single plasma.

Applicants respectfully disagree. Claims 1 and 13 recite two separate process steps: a first plasma treatment using a He plasma and a second plasma treatment using H<sub>2</sub> plasma. This is different from a process step involve both plasmas as alleged by the Examiner. In addition, Kim specifically teaches away from performing a second treatment, because plasma treatment has no significant influence on the dielectric constant. Therefore, the process as disclosed in Kim is different from the process as recited in claims 1 and 13.

Thus, for this mutually exclusive reason, the examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection under 35 U.S.C. §103(a) should be withdrawn.

**2. Prior Art That Teaches Away From the Claimed Invention Cannot be Used to Establish Obviousness**

In the present case, the Kim reference, by providing that the plasma treatment does not have significant influence on the dielectric constant, clearly teaches away from claims 1 and 13, recited above. Contrary to performing a second treatment of H<sub>2</sub> plasma, Kim teaches away from performing such second treatment, because the plasma treatment in Kim does not have significant influence on the dielectric constant. Thus, for this reason alone, the examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection under 35 U.S.C. §103 should be withdrawn.

**3. The Modification of Reference is Improper**

Assuming, arguendo, that none of the above arguments for non-obviousness apply (which is clearly not the case based on the above), there is still another, mutually exclusive, and compelling reason why the Kim reference cannot be applied to reject claims 1 and 13 under 35 U.S.C. § 103.

§ 2142 of the MPEP also provides:

*...the examiner must step backward in time and into the shoes worn by the hypothetical 'person of ordinary skill in the art' when the*

*invention was unknown and just before it was made.....The examiner must put aside knowledge of the applicant's disclosure, refrain from using hindsight, and consider the subject matter claimed 'as a whole'.*

Here, Kim fails to disclose or suggest, the desirability of the modification to perform a second plasma treatment of H<sub>2</sub> plasma on said transformed low k dielectric layer as specified above and as claimed in claims 1 and 13. There is no mention of performing a second plasma treatment in Kim, since Kim is only interested in performing a first treatment to form a plasma-treated silicon oxycarbide layer that can be used as an interlayer insulation layer.

Thus, it is clear that the reference does not provide any incentive or motivation supporting the desirability of the modification. Therefore, there is simply no basis in the art for modifying the references to support a 35 U.S.C. § 103 rejection.

In this context, the MPEP further provides at § 2143.01:

*The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.*

In the above context, the courts have repeatedly held that obviousness cannot be established by modifying the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the modification.

In the present case it is clear that the examiner's combination arises solely from hindsight based on the invention without any showing, suggestion, incentive or motivation in either reference for the modification as applied to claims 1 and 13. Therefore, for this mutually exclusive reason, the examiner's burden of factually supporting a *prima facie* case of obviousness has clearly not been met, and the rejection under 35 U.S.C. §103 should be withdrawn.

**Conclusion**

It is clear from all of the foregoing that independent claims 1 and 13 are in condition for allowance. Dependent claims 2-12 and 14-23 depend from and further limit independent claims 1 and 13 and therefore are allowable as well.

An early formal notice of allowance of claims 1-34 is requested.

Respectfully submitted,



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